A Special
Datapro Report

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A Buyer's Guide to Electronic Funds Transfer Terminals

WHAT IS AN EFTS TERMINAL?

We're pleased to expand the scope of *DATAPRO REPORTS ON BANKING AUTOMATION* by adding this section dedicated to the coverage of terminals used for on-line banking, but placed at remote locations.

Such devices, often generically called remote service units (RSU's), have been in use for some time, starting with the famous Hinky-Dinky experiment early in 1974. Since that time, despite some formidable legislative and judicial obstacles, the concept has blossomed, and RSU's can now be found in many supermarkets and other retail stores. In addition, it now seems safe to say that the concept is here to stay (barring restrictive legislation) because consumers are finding the opportunity to conduct banking transactions away from the bank building to be a most convenient expedient. (And, as most bank managers grudgingly admit, increased convenience can offset the most impressive-looking edifice, the most imaginative marketing program, and the most efficient customer service that an institution can devise).

Another indication of the impact of RSU's is apparent right here at Datapro. Our team of telephone consultants has seen a growing interest in those devices based on questions received from subscribers. And to top it off, it is apparent from the reports that follow that numerous equipment vendors are convinced that RSU's have a future. Why else would terminals be designed with that use uppermost in mind when the early experiments managed to get by with existing terminals that were adequate, though by no means ideal, for the job? Thus, the decision was made to expand this information service by incorporating detailed reports on terminals used for remote banking.

The initial problem is one of definition. Just what hardware units should be included in reports of this kind? At this time, there are very few terminals being used at the point of sale to perform banking transactions, and many of the ones in use were pressed into service, so to speak, because early in the evolution of remote banking there simply were no terminals available designed specifically for that function. Many terminals that had been sold as the "front ends" for credit authorization systems were found to be useful as RSU's, and many of the on-line teller terminals designed for use in financial institutions could be used for banking at the point of sale as well.

It was decided that the sensible approach would be to include in this EFTS Equipment section those terminals whose apparent *primary purpose* is to handle remote banking functions at point of sale locations. Even that definition does not present a completely clean demarcation, because *actual utilization* has to be considered as well. Thus, the AMCAT terminals from Addressograph Multigraph are described in this section, despite their general recognition as credit authorization terminals, because the AMCAT is probably the most popular device now being used to perform banking transactions at the point of sale.

Are banking terminals in non-bank locations just a passing fad? We think the early experience clearly indicates that remote service units will be an important component of automated banking systems for a long time to come. This buyer's guide presents some thoughts on what to look for when buying manned remote terminals, and the detailed product reports that follow describe the currently available equipment.

WHAT TO LOOK FOR

The answer to the question of what to consider in buying EFTS terminals depends largely on what the user wants to get out of the program. One of the advantages of remote banking is that the financial institution can legitimately place constraints on the participants, services, and amounts offered. The initial step, once an institution has decided that it wants to implement remote banking, is to decide just what services it would like to offer and how the transactions will be recorded and settled. Then, using the information in the detailed product reports that follow, look for the terminal that can best satisfy those requirements.

Following are some of the factors that might be taken into consideration:

- What has your experience been with on-line terminals? Are your teller windows now on-line?
- Do you plan to intermix RSU terminals in the same network with other manned or unmanned terminals?
- Do you intend to have customers use a plastic card for identification? If so, do you have an existing card base or must it be created in order to begin the program?
- What central computer system are you using?
- Do you want a completely packaged system, including software, or do you intend to tailor the system by preparing your own software to meet your specific requirements?
- How many terminals at how many locations will the system include? If warranted, do you anticipate expanding the system to other sites?
- What kinds of retail stores do you plan to use?

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- If the terminals are to be located in supermarkets, are they to be placed at checkout counters, at courtesy counters, or both?
- Do you require a printing terminal?
- How do you want to arrange end-of-day settlement of debits and credits with the retailers?
- What kinds of reports should be generated by the system?

With these considerations in mind, a perusal of the product reports that follow should provide a head start in finding the terminal that best meets the requirements of your planned system. Then, a close examination of the products that appear to be suitable, perhaps followed by a period of field testing, will help to assure a successful program.

HOW THE REPORTS ARE STRUCTURED

The reports on EFTS Equipment have the same basic structure as those covering on-line teller terminals in Section B11. A Management Summary provides a overview of each terminal and the system of which th terminal is a part, and a Characteristics section provid details on specific aspects of the terminal and system.

User surveys are generally omitted at this time simpl because of limited experience with this class equipment. In fact, most of the terminals have yet to b delivered in other than prototype form. The anticipate first delivery dates for production models are noted in th individual reports. In accordance with our usual practic Datapro will provide user ratings and analyses of us experience with these products as soon as it is practical t do so.

The physical characteristics of each device in terms weight, external dimensions (an important consideratio in this application), and power requirements are include Communications capabilities, system configuration poss bilities, and prices are also included so that the repor will give the reader the opportunity to consider all face of the system.□

Addressograph Multigraph Corp.
AMCAT Terminal Management System

MANAGEMENT SUMMARY

The AMCAT terminal, popularly recognized as a credit authorization device, is now finding acceptance in the funds transfer arena for processing remote banking transactions. The vendor has evolved the product along with the changes taking place in banking, so that presently there are various configurations of AMCAT terminals on the market, as well as a minicomputer-controlled Terminal Management System that provides additional hardware and packaged software to assist the user in designing an efficient, flexible network of terminals.

Although not yet formally announced, Datapro has obtained pre-release information on a new AMCAT I-C terminal and a new terminal control system. The new terminal is designed for operation by the customer to obtain check cashing authorization. The new system is designed to handle smaller networks of AMCAT terminals than the original Terminal Management System can efficiently control. The lower-cost system can be upgraded as user requirements expand. Also, a previously announced terminal, the AMCAT III, has been withdrawn without having been marketed.

AMCAT terminals are much in evidence in the experimental projects in which financial institutions have placed terminals in supermarkets and other retail locations in order to perform banking transactions as well as credit authorization and check guarantee functions. As remote banking continues to make headway, the vendor's experience in supplying terminals for some of those early systems should be a valuable contribution to future success.

The original Addressograph Multigraph credit authorization terminal known as the AMCAT is now called the AMCAT I. It is an integrated device that includes a form ➢

The AMCAT terminal was originally developed as an on-line credit authorization terminal. The product has subsequently evolved into a full line of terminals suitable for a variety of functions including remote banking. The AMCAT Terminal Management System is an integrated hardware/software package that provides control for AMCAT terminal networks.

CHARACTERISTICS

MANUFACTURER

Addressograph Multigraph Corporation, Multigraphics Division, 19701 South Miles Road, Warrensville Heights, Ohio 44128. Telephone (216) 587-6660.

SYSTEM PROFILE

The AMCAT Terminal Management System consists of terminals controlled by a minicomputer through a series of low-speed leased telephone lines. The controller acts as a message concentrator and dispatches messages from the terminals to a host central processor over a higher-speed leased telephone line, and relays the responses to the terminals over the same telecommunications lines. System software provides for the compatible interaction of the hardware and communications components of the system.

Terminals used in the system can be any of the various AMCAT models currently offered by the company. The AMCAT I includes a numeric and functional keyboard, a digital display, a magnetic stripe card reader, and an imprinter. Integrated with the terminal are communications features. The AMCAT II is identical except that the internal modem provides the capability to operate over a dial-up telecommunications line. The AMCAT I-C, not yet released, includes a special module that provides instructions for customer operation. ➢

The AMCAT I terminal is in widespread use as a credit authorization device. Recently it has been adapted for use in check authorization and funds transfer functions. Now, Addressograph Multigraph has designed options for the AMCAT I and will be offering a new version of the terminal that will satisfy the specific functional requirements of all those applications.

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set imprinter as well as a keyboard, a display and indicator lights, and a magnetic stripe card reader. A version named the AMCAT II offers identical features with the exception that computer access is obtained via a dial-up telecommunication line rather than over leased lines. Factory-installed options recently announced include an inked roller platen/check tray to accommodate both the imprinting of checks and 80-column forms and sets, and expanded message indicators and keyboard to provide more functional capability in the cashing of checks and for electronic funds transfer. A customer keypad for the introduction of a Personal Identification Number (PIN) can be cable-connected to the terminal. The not-yet-released AMCAT I-C incorporates the check tray as a standard component and includes a top-mounted module that provides lead-through instructions for customer operation.

The company offers users of AMCAT terminals a complete management system that provides all the necessary hardware components and the software to make them function to their fullest extent. The AMCAT Terminal Management System allows AMCAT terminals of any type to be intermixed in a large network. It includes a 64K minicomputer and a variety of optional components that the user can include in a flexible and sophisticated network. Although it is possible for the terminals to communicate directly with a host computer over leased telephone lines, the ATMS will in most cases be a more efficient and useful alternative for all but those users with only a few terminals.

The minicomputer controller serves as a message concentrator and contains the communication interfaces necessary to configure a network of AMCAT terminals of any type with a central computer system. A low-speed (300 or 1200 bps) leased line interface for the AMCAT I and a 300-bps dial-up line interface for the AMCAT II allow those terminals to connect with the processor over leased or dial-up telephone lines. A 2400-bps data link interfaces the controller with a mainframe computer.

The ATMS system provides the IBM binary synchronous communications protocol or, as an option, the Burroughs asynchronous protocol. A switch option permits AMCAT terminal transactions to be forwarded for processing to the appropriate host computer in a network of hosts. The response from the host will then be directed back to the originating terminal. Customer application code is accepted by the system to determine or select the right host based on message characteristics. The ATMS switching option routes terminal communications to various CPU's using IBM BSC protocol, Burroughs asynchronous protocol for TC Series terminals in native mode, or emulation of IBM 2260 display terminals. Support is provided for additional 2400-bps lines to each host, and the number of lines for each host can be varied.

The ATMS system contains two magnetic tape cassette drives. These are used to load programs into the system. Initially, the operator must turn on the concentrator,

Although the system described herein assumes the use of a minicomputer controller for a network of terminals, the AMCATs can alternatively be controlled directly from a main central computer. Depending on the terminal in service, direct communication with the host is via a leased line or a dial-up telephone line.

CONFIGURATION

Ordinarily, the AMCAT terminals are positioned in retail stores at checkout counters or customer courtesy locations, or in banks at teller stations. The new customer-operated AMCAT I-C can be placed anywhere in the store that would be convenient to customers. Placement depends to some extent on the functions to be performed by the terminals. Use of a magnetic stripe card and a personal identification number requires that a keypad be accessible to the customers.

The original AMCATs are operated by store or bank personnel. They require input from a keyboard and action depending on the response from the computer.

Although designed to operate on-line to a central computer in order to access a data base of account balances and/or credit limits, the Terminal Management System can also be used in an off-line mode. User application code is required to provide the Terminal Management System with off-line fallback capability.

In order to minimize line costs, the system offers an AMCAT Multiple Distribution Module (AMTDM) in seven different versions. The AMTDM is an accessory device designed to provide a suitable line interface for a number of AMCAT terminals. Connection of the local terminals to the AMTDM is via a customer-supplied private wire system. Connection of the inbound leased line is via a communications carrier-supplied termination block and loop-back switch. The inbound connection should be a Bell Type 3002 channel, unconditioned, or its equivalent.

COMMUNICATIONS

In the AMCAT Terminal Management System, the terminals communicate with the system minicomputer over multidrop lines at 300 bits per second. AMCAT II terminals communicate with the minicomputer via dial-up lines. The data link between the minicomputer and the host CPU for all terminals is a 2400-bits-per-second leased telephone line.

AMCAT I and AMCAT I-C terminals can communicate over full-duplex, 4-wire, leased lines in multidrop or single-drop fashion. The standard 300-bps internal modem can be optionally replaced by a 1200-bps unit. Transmission is in the ASCII code.

The AMCAT II operates over a dial-up telecommunications network. The terminal interfaces with a Data Access Arrangement (DAA), if required, and a telephone set with a data key. The telephone set can include a card dialer for automatic dial-up. Any of the available dial-up telephone services can be used, including DDD, WATS, and FX.

Communications with a customer's host CPU is accomplished by means of either the IBM binary synchronous communications protocol or the Burroughs asynchronous protocol. No modification of the ATMS is required if the data format and content produced by the terminals are used. Where message reformatting is necessary, program exits are provided so that the user's application-dependent code can be added to the system.

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mount the program tape on a cassette drive, and initiate the ROM bootstrap. During initialization, the software determines the number of line adapters on the concentrator and properly initializes the system. The host computer can suspend operations overnight by issuing shutdown software messages or by deactivating the data link. The concentrator then suspends activity in the system and waits for the host to become active.

An optional magnetic tape device handler module provides support for computer-compatible magnetic tape. Up to four magnetic tape transports can be interfaced to one ATMS. The handler provides full support for standard magnetic tape commands via a set of request codes received from user-written application code. The coding can provide for particular file formats, record formats, translation, labeling, power failure recovery, etc.

The ATMS system also offers a disk storage support option. This provides full support for disk drive commands via user application code in the same manner as the magnetic tape option. Up to 40 million bytes of on-line storage can be obtained from 4 drives of 10 million bytes each. Both the disk and tape drives are supplied by Interdata, as is the minicomputer controller itself. The software that supports the entire system, however, has been designed by Addressograph Multigraph to drive AMCAT terminal networks.

In order to maximize the utilization of leased lines and reduce communications costs, AMCAT Multiple Terminal Distribution Module is offered. The AMTDM is an accessory device designed to provide a suitable line interface for allowing a number of AMCAT terminals to operate through one (or two) 4-wire, full-duplex, leased line drop(s). Certain models of the AMTDM allow the interconnection of additional leased lines to provide a multi-drop capability with only point-to-point leased lines being ordered. This can provide additional savings in communications costs under rate structures in effect for some geographic areas. There are seven different models available for various numbers of AMCAT terminals in one or two leased line drops. Because of their modular construction, two AMTDM's in tandem, as well as other configurations, may be possible, depending on the terminal placement.

In summary, the AMCAT Terminal Management System functions as a message concentrator for AMCAT terminal networks. It operates in a minicomputer and controls a number of terminals. The software polls the terminals through a series of low-speed telephone lines; relays the messages to a central processor system at 2400 bps via a leased telephone line; and sends the reply messages back to the terminals. ATMS software provides the following features:

- Computer control and management of the network, including polling and selection of terminals.
- Automatic detection and processing of terminal and line-related errors, and recovery when possible.

A keypad can be cable-connected to an AMCAT terminal to enable the customer to enter a personal identification number. The indicator light is operator-controlled from the terminal.

SYSTEM CONTROL

The AMCAT Terminal Management System is a complete hardware/software package. Control of terminal functions and communications to and from the host computer is provided by the system software. The terminal control software includes network management functions and the polling and selection of terminals. Detection, processing, and recovery (where possible) of terminal and line errors are carried out. Software is included that allows for terminal reconfiguration, so that the initial set-up can be established or modified during initialization or operation. Terminal functional test routines for the installation and check-out of terminals are also provided.

The system software supports one or more host CPU communication lines via either the IBM BSC or Burroughs asynchronous protocol, and supports switching to more than one host using either the same protocol or mixed protocols. The system receives, stores, and schedules messages for transmission to the central processor and the individual terminals. Line error recovery is provided on both the high-speed CPU communication line and the terminal lines, and the program maintains statistics on line performance. Provision is made in the software for operating off-line (with user application code) in the event of downtime in the host or failure in the communication line. If the user wishes, the system can be operated off-line at all times (i.e., with no link to a host computer).

A CPU command interface and a local system control module are included in the ATMS software support. The CPU software supports a set of system control commands, and the local system control software supports a local teletypewriter as the system control console.

COMPONENTS

ATMS SYSTEM CONTROLLER: The AMCAT Terminal Management System derives its control and logic from a 64K-byte Interdata minicomputer. The unit includes, in addition to the processor module and core memory, a low-speed line interface for communication with AMCAT terminals, a 2400-bps line interface for communication with a mainframe computer, appropriate modems, two

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- Maintenance of line performance data, including provision for activity reports.
- Provision for the addition of programming for reformatting input and output messages to conform to customer system requirements.
- Receipt, storage, and scheduling for transmission of inbound and outbound message traffic.
- Support of a local teletypewriter (Model 33 ASR) as the system control console.
- Provision for the installation and check-out of terminals concurrently with normal message processing.
- Support of a voice-grade host CPU communications line.
- Automatic detection, processing, and recovery of line-related errors on the CPU communications line.
- Support of a set of system control commands.

The entire network can be designed to optimize the use of communications facilities so that line costs are kept as low as possible.

In order to provide similar capabilities to a smaller network of AMCAT terminals, the company is planning to release the AMCAT Terminal Controller (ATC). The new controller can be utilized initially in a customer's start-up terminal network or be incorporated into an existing ATMS network to function as a local or remote terminal controller. The ATC is a communications controller capable of interfacing AMCAT terminals to a customer's central processing unit. Its primary purpose is to provide the capability for a host interface for small to medium-size networks. The ATC system's network control functions are upward-compatible with those provided by ATMS.□

magnetic tape cassette drives, a universal clock, and an automatic loading unit for program input. The processor supports a network of AMCAT terminals located at remote sites.

A variety of options can be used to enhance the capabilities and flexibility of the system. An interface and software support are offered for a Teletype Model 33 ASR to act as the system control console. System support is also offered for magnetic tape units, disk storage, a switch option that permits the terminals to communicate with more than one host computer through a single system processor, and a distribution module that provides a line interface allowing a number of AMCAT terminals to operate through one (or two) 4-wire, full-duplex, leased line(s).

The disk storage support option allows a user-written file handler to create and maintain disk files on-line with the system, permitting additional user-controlled processing functions in the ATMS. Up to four disk drives can be interfaced to the system, with a capactiy of 10 million bytes per drive. Each disk drive has one fixed cartridge and one removable cartridge of 5 million bytes each. Separate cabinets are provided for the drives, with one or two drives housed in each cabinet. A disk controller provides proper formatting, accepts commands, detects errors, and responds with specific disk drive status indications. It is interfaced to the ATMS system via a high-speed selector channel.

The magnetic tape support option provides support for 9-track, computer-compatible magnetic tape and allows a user-written file handler to create and maintain tape files on-line with the system for interchange with other computer systems, message logging, and other functions. The tape can be recorded at a density of 800 bits per inch, with a data transfer rate of 36K bytes/second, or at 1600 bps, with a data transfer rate of 72K bytes/second. A magnetic tape controller provides all tape formatting, accepts commands, detects errors, and responds with specific transport status indications. It is likewise interfaced to the system via a high-speed selector channel.

AMCAT TERMINAL CONTROLLER: Provides the capability to interface a host CPU with AMCAT terminals in small to medium-size networks. It can interface with up to 7 low-speed multidrop data lines and control up to 200 terminals. Each line can support up to 63 terminals and can be up to 1500 miles in length.

The ATC supports one high-speed host CPU communications line using asynchronous communications discipline tailored for the IBM 2260 (or Burroughs TC 500/700 in emulation of the IBM 2260), the Burroughs TC 500/700 in native mode, or the NCR 270. Provision has been made for the future implementation of other host protocols, either synchronous or asynchronous.

The AMCAT Terminal Controller has not been formally announced to date. This pre-release information has been provided by A-M.

AM COMPUTER ACCESS TERMINAL—AMCAT I: The AMCAT I is essentially the original version of the Addressograph Multigraph credit authorization terminal that is in wide use in a variety of retail stores, banks, and other businesses. It is a completely integrated terminal designed to be used in an on-line system that provides a positive or negative credit authorization function.

The terminal keyboard consists of a set of 10 numeric keys for data input, 3 function keys (Reset, Delete, and Process), and 3 field definer keys. The 16 keys are compactly arranged in a single group, with the numeric keys distinguished not only by the key inscriptions but by black on white rather white on black inscriptions. The operator keys in data that is required for the transaction; a 128-character internal buffer (256 characters as an option) stores all input data until it is transmitted to the computer.

An eight-digit visual display indicates all input from the operator keyboard. A decimal point can occupy one of the display positions as an option. Although used primarily for visual verification of input data, the display can also be used to show responses from the computer if required, such as account balances or credit limits.

A magnetic stripe card reader is integrated to the terminal to obtain transaction input from encoded data and for the purposes of proper identification. The card reader is designed to read cards encoded in the ABA standard format on Track 2. As an alternative, embossed characters in the 7B font can be read.

The terminal includes two standard message indicators and four optional indicators that can be selected by the user. The two standard messages are "Ready" to indicate that

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the system is available to handle a transaction, and "Off-Line" as an indication that the terminal is operating without access to a central computer. The four optional messages normally would be selected to indicate the status of a specific action to be taken in response to the transaction inquiry.

An imprinter is designed for forms set imprinting, either on-line or off-line. It provides printing of a quality that is OCR-scannable on an 80-column form. As an alternative, the 7B font can be printed on two lines for scanning on 51- or 80-column forms.

Other features of the AMCAT I terminal include up to 30 characters of field-replaceable programmable read-only memory for merchant identification, terminal poll ID switches, and printed operator instructions inscribed on the face of each terminal.

Some new optional features for both the AMCAT I and AMCAT II terminals were released by the vendor at the time this report was being prepared. Those options include a special tray to insert either form sets or checks for imprinting, expanded message indicators and keyboard, a reset/message interlock, a line activity indicator, and an in-line communications cable connector. The first two are of particular importance at this time in remote banking operations.

The inked roller platen/check tray, offered as an option for the AMCAT I and II, is identical with the device that is incorporated as standard on the yet-to-be-released AMCAT I-C. It is designed to give the older terminals the ability to imprint upon standard checks, providing an economical and efficient means for the performance of a normal check-cashing function.

To operate a terminal equipped with the special tray, the clerk inserts the customer's identification card, keys in the dollar amount of the check, positions the check in the forms tray, and slides the tray forward until it latches in position. The "Process" key on the terminal is then pressed. Assuming the request meets all the approval criteria established by the user, the computer responds with an approval. An imprint command, also received from the computer, directs the terminal to imprint the back of the check with information such as the customer account number, approved check amount, a computer-assigned authorization code, merchant ID, and date.

The check tray option can be installed only at the factory and must be specified at the time of order.

The option to expand the message indicators and keyboard of an AMCAT terminal is likewise installable only at the factory. The feature provides more functional capability. The availability of additional keys to define transaction types and more message indicators will facilitate the terminals' use in application areas beyond their normal credit authorization functions, such as check cashing and electronic funds transfer.

Depression of one of the four additional keys can indicate to the system the type of transaction or the type of data field entered into the terminal's buffered memory. It allows frequently used functions or data fields to be identified with one keystroke, compared to the two keystrokes otherwise required with the FCT (function) key and a data key. Additional functions can still be specified using the FCT key. This new option also permits 10 different message indicators to be illuminated or extinguished under computer command during a transaction cycle. Both the message indicator legends and the key legends can be specified by the customer.

An AMCAT I weighs 40 pounds and measures 15¼ inches in length, 17 inches width and 8¾ inches in height. It is designed to operate in an environment of 40 to 110 degrees F. and 10 to 90 percent relative humidity. Power requirement is of 104 to 127 VAC, 60 Hz. Power and communications cords are supplied in lengths of approximately 9 feet.

AM COMPUTER ACCESS TERMINAL–AMCAT II: This terminal is identical in nearly all respects with the AMCAT I. Its size, operating characteristics, and functional components are the same except that the AMCAT II is designed to operate with a telephone handset over a dial-up telecommunications network. Automatic dial-up of the central computer via a card dialer can be accommodated. The AMCAT II can be operated using DDD (Direct Distance Dialing), WATS (Wide Area Telecommunications Service), or FX (Foreign Exchange) service.

AM COMPUTER ACCESS TERMINAL–AMCAT I-C: This new terminal is yet to be released by the vendor, but the following information has been provided. In essence, the AMCAT I-C is designed to allow check authorization to be performed by the customer with no operator intervention. The terminal includes the special check tray, now offered as an option on other AMCAT terminals, so that checks inserted by the customer, if approved, are automatically imprinted with an authorization. This permits the merchant to offer a check-cashing function (either positive or negative, depending on the computer file contents, or even on a bank-guaranteed basis if the terminals are connected to a bank computer) without using employees to operate the terminals. AMCAT I-C terminals could be placed anywhere in the store that is convenient to customers.

The primary difference in the AMCAT I-C compared to other AMCAT terminals is the presence of a special module mounted on the top of the terminal. This module provides lead-through instructions for the customer to make operation as easy as possible. The terminal also includes 10 response message indicator lights, a 10-key alphanumeric set for the indexing of dollar amounts and PIN codes, and 8 additional keys to indicate the type of transaction.

AUXILIARY SECURITY KEYPAD: This device allows a customer to enter a personal identification code in numeric, alpha, or combination format. The unit consists of a 10-key set in the standard pushbutton telephone alphanumeric format, 2 function keys, and an indicator light. The unit can be connected to any AMCAT terminal by a standard 20-foot cable (or by an optional 8- or 14-foot cable). Each unit is 3 inches wide, 5½ inches deep, and 2 inches high. Use of the auxiliary keypad requires that the terminal to which it is attached be equipped with the Message Indicator option.

The AMCAT terminal operator activates the keypad by depressing a function key and the "5" numeric data key. This lights the indicator lamp, and the customer then enters the code and presses the "End" key. The indicator is then extinguished, and control is transferred back to the terminal operator for completion of the transaction. The second function key on the customer keypad allows the customer to correct errors made in entering the code.

AMCAT MULTIPLE TERMINAL DISTRIBUTION MODULE: The AMTDM provides a line interface to allow several terminals to operate through one or two 4-wire, full-duplex, leased lines. The units weigh approximately 25 pounds, and are 9.62 inches high, 13.25 inches wide and 11.18 inches deep. They require 120 VAC power.

Following is a tabular summary of the AMTDM models and the main characteristics of each. ➤

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Model Number	Max. No. of Local Terminals	Max. No. of Remote Terminals	No. of Leased Line
AMTDM:			
110-00	10	–	1
119-00	19	–	1
220-00	20	–	2
109-05	9	5	1
100-05	–	5	1
100-09	–	9	1
200-10	–	10	2

DELIVERY

Terminals and supporting components are available 60 to 90 days following receipt of order.

PRICES

AMCAT terminals and supporting hardware are available at the unit prices indicated below in quantities less than 100 units. Quantity discounts are available for the AMCAT I and AMCAT II, and maintenance is performed by the vendor under contract.

	Purchase Price
AMCAT Terminals and Terminal Options:	
AMCAT I	$ 1,445
AMCAT II	1,565
AMCAT I-C*	1,700 to 1,900
Message indicators (includes group of 4 special legends)	50
In-Line communications cable connector	10
Decimal point	N/C
2-wire modem for 300 bps	120
4-wire modem for 1200 bps	150
Auxiliary security keypad	125
AMCAT Terminal Management System and Options:	
ATMS System Processor, including basic system software	70,000
Magnetic Tape Support Option–Controller and one 800-bpi tape drive	14,500
Disk Storage Support Option–controller and 10 million bytes of storage	26,500
Switch Option	14,500
Asynchronous Protocol Option	N/C
AMCAT Multiple Terminal Distribution Modules:	
AMTDM-110-00	1,350
AMTDM-119-00	1,600
AMTDM-220-00	1,600
AMTDM-109-05	1,600
AMTDM-100-05	1,350
AMTDM-100-09	1,600
AMTDM-200-10	1,600
AMCAT Terminal Controller*	20,000 to 30,000

* Products not yet released; prices shown are "targeted" price ranges. ■

Burroughs TT 602
Transaction Control System

MANAGEMENT SUMMARY

Although not scheduled for first delivery until the second quarter of 1976, the Burroughs TT 602 Transaction Control System promises to have a noticeable impact on the market for remote banking terminals. There are two reasons for this observation: first, the TT 602 represents the initial entry of Burroughs into the point of sale marketplace; second, the TT 602 appears to offer the most versatile choice of devices in terms of functional capabilities among the EFTS terminal products available today. That quality, together with its compact size, low cost, and ability to be introduced into existing networks of Burroughs terminals, makes the TT 602 an attractive EFTS product.

It could be argued that the TT 602 is not really Burroughs' first venture into point of sale products. Several years ago the company introduced a credit authorization terminal, the TU 300, that had a rather short product life. In 1974, the announcement of the TR and TT series of terminals, represented by the TR 101, TR 102, and TT 102, was accompanied by the statement that the latter, at least, could be used at the point of sale in the retail environment to perform a variety of banking functions. However, the TT 102 has not subsequently been actively promoted for that purpose, although field-testing in a retail store has been under way for some time.

The Burroughs TT 602 is the latest in a family of TR and TT Series terminals. It is designed for a variety of functions, but is intended primarily to perform electronic funds transfer transactions from point of sale locations. The TT 602 can be intermixed in a network with other Burroughs terminals and processors.

CHARACTERISTICS

MANUFACTURER

Burroughs Corporation, Burroughs Place, Detroit, Michigan 48232. Telephone (313) 972-7269.

SYSTEM PROFILE

The TT 602 is a dual-module terminal. The two modules are cable-connected at a distance up to eight feet away from one another. The basic keyboard/display module includes a numeric keyboard, a display panel, and indicator lights; numerous other components can be added as options. A second module contains the terminal memory, power supply, logic, modem, and data communications processor.

The terminals are operated on-line to a central computer system. They can be interfaced over telecommunication lines to a CPU without intervention, or via DC 140 Branch Control Computer of the type used in the Burroughs TCS 1000 system of banking terminals.

The Burroughs TT 602 is available in four different models of varying performance characteristics. The terminals can be placed at point of sale locations to perform banking and credit transactions, and the network can be operated within a system of other Burroughs terminals such as on-line teller terminals.

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By contrast, the TT 602 was announced as a terminal that could be used in several applications, but the emphasis was definitely on the point of sale function for funds transfer. Further, its design and functional features certainly indicate that Burroughs had remote banking uppermost in mind in the creation of the product. Thus, despite the earlier appearance of the credit authorization terminal and the TT 102, it is the TT 602 that will carry the Burroughs standard for manned, remote banking terminals. Considering the vast potential that this market offers, it is no insignificant role for the TT 602.

That leds us to the second point: the terminal appears well qualified to win immediate acceptance. There are actually four different terminals in the TT 602 series. Each of these is contained in two separate modules. Common to each is the power supply/logic module, which connects to the keyboard/display module from a distance of up to eight feet and contains the terminal memory, power supply, logic, modem, and data communications processor. A microprocessor utilizing large-scale integrated circuitry is the vehicle by which these elements control the operating modules.

Either an internal or external data set can be used to establish communications with a remote processor. Internal data sets and cables are supplied by Burroughs. The TT 602 uses Burroughs standard data communications procedures, which permit different types of Burroughs terminals to be mixed in a network and to share the same communications line. These include the TT 102 terminal (which is similar to the TT 602 but includes a printer and an integrated power/logic component) and terminals in the TU, TC, and TD series. Concatenation of these terminals (intermixing in a network sharing common controllers and communications) requires the use of special cables supplied by Burroughs.

Thus, the TT 602 can be fitted into an existing network or made part of a newly designed system in a variety of ways. The most significant configuration, in this discussion of the TT 602 as a remote banking terminal, is the placement in retail stores, interfaced either to a local system processor or over telecommunication lines to a bank site for direct interaction with a central computer system. Depending on user requirements and network design considerations, the network environment can include two-wire dial-up lines, four-wire leased lines with or without dial-up back-up capability, or direct connection to a central computer or local system and communications processor. TT 602 terminals can utilize the processing capabilities of the DC 140 minicomputer controller, which is often configured in systems utilizing the TU series banking terminals. For a complete overview of the Burroughs banking products, and how TT 602 can fit in, please consult the special Feature Report on Burroughs beginning on page B07-112-101 of this publication.

The TT 602 keyboard/display module represents the operator-controlled part of the terminal. The basic

There are four different models of the TT 602. Each contains, in addition to the basic components outlined above, either 150-digit or 256-digit terminal buffers and the potential to accommodate magnetic card read or read/write, an internal data set, and a separate keyboard for Personal Identification Number introduction. Enhanced models include either 7 or 11 user-definable function keys, a supervisor lock, a back-up rate switch to allow dial-up back-up for a normal leased line environment, and capped numeric keys. Magnetic stripe card readers can be either read-only for Track 2 or Track 3, or read/write for Track 3.

CONFIGURATION

The number and type of terminals that can be distributed in a network depend on many variables. The capabilities of the controlling mainframe computer, the remote system and communications processor, or the local DC 140 minicomputer, as well as the extent of the existing terminal network (TC, TU, and TD series terminals), are determining factors. In a retail store environment in which the terminals are used to perform banking transactions, a local controller can be provided to interface terminals at that location to the host computer over telecommunications lines; the terminals can connect with a DC 140 or B 776 System and Communications Processor at a bank or other remote site; or the terminals can communicate directly with a host CPU without the minicomputer controller. In most circumstances, the first alternative is likely to be the most advantageous configuration, since it would tend to produce the most efficient use of telecommunications lines and reduce demands on the host processor.

COMMUNICATIONS

TT 602 terminals have input and output (transmit and receive) buffers of 150 or 256 digits. They transmit and receive via the buffer in the standard Burroughs asynchronous, half-duplex discipline at transmission speeds ranging from 75 to 1800 bits per second. Either external or internal modems can be used.

The network environment can include 2-wire dial-up lines, 4-wire leased lines with or without dial-up backup capability, or direct connection to a central computer or local system and communications processor. The procedures available are poll/select, group polling, fast select, and modified contention. The modem interface is EIA RS-232C standard. The code consists of characters of 10 bits, transmitted least significant bit first. Longitudinal message parity checking is used.

SYSTEM CONTROL

Each TT 602 contains a microprocessor utilizing large-scale integrated circuitry. The terminals are preprogrammed with fixed sequences, but communications control emanates from the central computer or branch control minicomputer, whichever is used. Since the procedure can be polled or modified contention, there are times when the interrupting terminals are in fact controlling the system; it all depends on the procedure and network structure.

A self-contained Confidence Test Routine is activated automatically when the terminal is turned on. This routine checks all of the terminal circuitry and reports the terminal's status on the display panel. The TT 602 guides and controls the terminal operator as data is entered into the terminal through a 16-digit panel display and/or a set of status/message lamps.

Burroughs has not indicated that the TT 602 or other terminals in the TT and TR series can be used with, or controlled by, equipment other than Burroughs' own.

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module includes a numeric keyboard, four basic function keys, a display panel, indicator lamps, an input/output buffer of 150 digits, and the potential to incorporate a magnetic card read or read/write unit, a Personal Identification Number keyboard, and an internal modem. Enhanced versions of the basic terminal are offered in three additional styles. The enhancements include incorporation of the magnetic card read (Track 2 or Track 3) or read/write (Track 3) capability, attachment of a separate hand-held customer keypad for PIN introduction, and an internal modem, as well as a larger-capacity buffer (256 digits), eight status/message lamps, user-definable function keys, a supervisor lock, back-up rate switch, and capped numeric keys. With this choice of functions and the opportunity to field-upgrade as a system expands and requirements change, the Burroughs TT 602 offers great flexibility in comparison to other EFTS terminal systems now on the market.

This flexibility is made possible by the presence of the microprocessor-based, LSI-circuitry power/logic module, and the opportunity for terminals to be controlled by local or remote system processors as well as by a central processing unit. Separation of the terminal into two modules may appear to be cumbersome in comparison to completely integrated units, but this arrangement allows the operator module to be contained in a very small compartment while affording all the versatility of function that has been described. Because the power/logic module can be cable-connected from up to eight feet away, and because Burroughs offers a bracket so that it can be mounted on a wall or other vertical space, configuration of the two modules should pose no problems in most locations.

The keyboard/display module has several features, both standard and optional, that should be especially noted. The 16-position digital display panel can be "paged" by pressing the appropriate key in order to display stored data fields sequentially. Entered data can be verified and corrected, if necessary, prior to transmission to the host computer. Conversely, information dispatched from the host can be displayed on the terminal panel.

The optional indicator lights, eight in number, can be used alone or in conjunction with the display to guide and control the operator in working the terminal. The basic module can be enhanced with either 7 or 11 user-definable function keys that can greatly expand the type and number of functions that can be performed.

The logic allows the numeric keyboard to be operated as an electronic calculator, with entries and results displayed on the panel. This is particularly significant when considering the TT 602 at retail store locations, because the clerk can place the unit in an off-line mode to calculate sales amounts, and then return to the on-line mode and transmit the data to complete a transaction.

The optional supervisor key switch allows an authorized person to key in (or read in through a magnetic stripe ➢

➤ COMPONENTS

TT 602 TRANSACTION TERMINAL: The basic terminal includes in the keyboard/display module a 12-key numeric keyboard, a 16-position display panel, and 10 user-definable function keys. The module is approximately the size of a desktop electronic calculator.

A paging key allows the display of stored data fields sequentially in order to verify and correct data prior to transmission. Data received from the central computer can also be presented on the display in variable-length data fields.

A separate module of the terminal contains the unit's memory, power supply, logic, modem, and data communications processor. It can be cable-connected to the operator module from up to eight feet away.

The basic features are enhanced in the four terminal models that are offered by Burroughs. The first of these is the Model TT 602-1. This terminal includes, in addition to the basic components, a 150-digit buffer, magnetic card reader or read/write potential, personal ID number potential, and internal modem potential.

The Model TT 602-2 adds to these features, 8 status/message lamps, a supervisor lock, and calculator capability. This model includes a magnetic card reader (no write capability) for either Track 2 or Track 3. The supervisor lock allows numeric constants, such as a merchant ID number, to be locked into the buffer to be transmitted with each message. The lock also enables temporary override of the normal terminal address. Calculator capability is obtained in an off-line mode. The numeric keyboard can be used to perform simple four-function arithmetic calculations, and then the system can be returned to the on-line mode for normal transactions.

The Model TT 602-3 contains all the basic and optional features of the TT 602-2 except that the buffer is expanded to 256 characters. Also, the unit features capped numeric keys and a backup rate switch that allows dial-up backup for a normal leased line environment.

The Model TT 602-4 includes all of the capabilities of the TT 602-3 except that it has a Track 3 magnetic card reader/writer rather than a Track 2 or Track 3 read-only unit. This permits updating of data on Track 3, such as account balances, under software control, or adding new account numbers to an existing card.

The keyboard/display module of the TT 602 in its basic form is 8.9 inches wide, 4.2 inches high, and 10.7 inches in depth. It weighs only 5.0 pounds. The addition of the optional magnetic stripe card reader, which is attached to the rear of the keyboard/display module, adds 3.3 inches to the overall depth of the unit and 1.2 pounds of weight, while the magnetic stripe read/write unit adds 4.2 inches in depth and 3.3 pounds. Thus, the module with read-only ability has the same width and height as cited above, but has an overall depth of 14.0 inches and weighs 6.2 pounds. The comparable figures for the read-write version are 14.9 inches of depth and a weight of 8.3 pounds.

The power supply/logic module weighs 28.6 pounds. It is 9.8 inches wide, 9.1 inches high, and 14.3 inches deep. The unit operates with U.S. standard power of 120 volts, 60 Hz from a three-wire, non-detachable power cord connected to the power supply/logic module. The cord length is 102 inches. ➤

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card) and secure any uniquely identified constants that are to be transmitted with each message. These would include merchant identification numbers in terminals placed in retail store locations.

At this writing, Burroughs has not indicated that the TT 602 terminals can be operated in any other than the native Burroughs mode. Thus, it appears that the potential user must anticipate controlling the terminals by means of local Burroughs system and communications processors and/or remote Burroughs mainframe computers. This might prove to be a significant impediment in the marketplace among financial institutions that are considering the TT 602 for point of sale banking transactions but are committed to competitive equipment in other areas. However, it is likely that expanded communications capabilities for the TT 602 will eventually allow a more diverse market base to be sought.

On the other hand, the attractiveness of the Burroughs approach to manned remote banking terminals represented by the TT 602 seems to assure success. The extent of TT 602 sales is likely to hinge more upon external factors affecting the market, such as legislative decisions, than upon the hardware itself. Based upon the present circumstances, it is likely that the TT 602 will be found in widespread use within a relatively short period of time.□

PERSONAL IDENTIFICATION NUMBER (PIN) KEYBOARD: The PIN keyboard is a simple hand-held device. It includes a 10-key numeric pad that enables the customer to introduce a code number in conjunction with the reading of encoded data from a magnetic stripe card inserted in the terminal card reader. The keyboard is cable-connected to the magnetic stripe card reader or reader/writer; is 2.7 inches wide, 1.7 inches high, and 6.4 inches deep; and weighs less than one pound.

DELIVERY

First deliveries of the TT 602 are scheduled for the second quarter of 1976.

PRICES

The following purchase prices are for unit quantities only. Discounts for purchases in greater quantities are available. The monthly rental rates quoted are for one-year leases. Somewhat lower rates prevail for three-year and five-year leases. One-time field installation charges are also shown where applicable.

	Purchase	Monthly Rental	Field Instal.
Series TT 602 Transaction Terminals (see "Components" for detailed descriptions):			
TT 602-1 (150-digit buffer)	990	39	–
TT 602-2 (150-digit buffer, 8 status/message lamps)	1,430	52	–
TT 602-3 (256-digit buffer, 8 status/message lamps)	1,540	57	–
TT 602-4 (same as 602-3 except has Track 3 write capability)	1,890	71	–
Data Set Cables:			
XC003 (25 ft.)	50	NA	–
XC005 (100 ft.)	125	NA	–
Concatenation Cables*:			
XC001 (1 ft. "Y" Cable)	50	NA	–
XC014 (1 ft. TC-TD)	75	NA	–
Internal Modems:			
TT 005 (1200 bps)	430	16	–
TT 006 (1800 bps)	575	21	–
Field Upgrade Capabilities			
TT 022 (magnetic card reader–Track 2)	300	11	60
TT 023 (magnetic card reader–Track 3)	300	11	60
TT 024 (magnetic card reader/writer–Track 3)	650	21	60
A 6002 (PIN keyboard)**	135	6	40
Other Components:			
TT 012 (PIN keyboard interface–required only on TT 602-1)	35	2	–
TT 028 (wall bracket for power supply/logic module)	28	1	–

*Concatenation cables also require a data set cable to provide the appropriate distance between systems.

**This PIN keyboard is only available when the terminal has magnetic card read or read/write, and reduces by one the number of user-definable function keys available. ■

Concord Computing Corporation 750 Transaction Terminal

MANAGEMENT SUMMARY

Concord Computing Corporation is in the business of providing on-line check authorization and credit authorization services to various retail establishments and financial institutions. Supermarkets are offered check authorization services, department and discount stores receive credit authorization services for their private-label credit cards, and financial institutions obtain communications and switching services for the authorization of bank credit card transactions from the company. With this background, Concord has developed and is now marketing a terminal to be placed at retail locations to perform banking transactions as well as check and credit authorization services.

The most unusual feature of the Concord Computing 750 Transaction Terminal is that it can be operated by individual customers rather than by store personnel to obtain check authorizations. However, it is not necessary that the terminals be operated in that way, and they can be placed at checkout counters and customer courtesy counters to be operated by store personnel. It should be remembered that the terminal does *not* dispense cash, but merely prints an authorization that must be converted to cash by store personnel.

The terminal is a completely integrated unit that includes its own microprocessor, memory, and communications interface in addition to the keyboard and other operating components. The only external device is an optional keypad for use by customers when terminals are operated by store personnel and personal ID numbers are required. Operation of the terminal is simplified by prompting sequences consisting of backlighted messages displayed on ➢

This terminal possesses the unusual attribute of being operable by either the customer or a store employee. It is a completely integrated terminal based upon a microprocessor, and is designed to interface on-line with a remote central processing system. The terminal can be used for various functions in the retail environment, including check guarantee, check and credit authorization, and routine banking transactions.

CHARACTERISTICS

MANUFACTURER

Concord Computing Corporation, 7 Alfred Circle, Bedford, Massachusetts 01730. Telephone (617) 275-1730.

SYSTEM PROFILE

The 750 Transaction Terminal is designed to be part of an on-line system accessing a central computer over telecommunications lines. The terminal includes its own microprocessor with two memory components, a keyboard, display panel, printer, and indicator lights. A magnetic stripe card reader and a separate customer keypad are offered as options.

The microprocessor operates the display and indicators, enables data entry, edits the data, recognizes transaction completion, and initiates data transmission upon being polled by the host computer. The memory components include a 4096-word fixed read-only memory (ROM) and a 256-digit working storage unit that provides processing memory and buffering for data communications.

The terminal also includes an internal modem compatible with Bell 202 series or Bell 103 series modems, and a ➢

The Concord Computing 750 Transaction Terminal is a most unusual device. It can be placed in retail establishments to be operated by store personnel or configured for customer operation. A backlighted prompter display panel provides lead-through instructions for all transactions.

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the terminal. The operator (customer or employee) utilizes a keyboard to select the type of transaction and to key in amounts and other information, and inserts a document to be printed in the tray provided on the terminal. These procedures are guided from start to finish by the lighted messages, which are displayed in the proper sequence, and by an audible tone that is sounded whenever the message changes. The terminal also includes a numeric display that indicates information entered at the keyboard and presents certain coded responses from the central computer system.

Although the terminal is a single integrated unit, a great amount of flexibility can be obtained through the programming stored within the terminal and in the central processor as well. The type of transactions to be performed, and whether the operation will be by customers or employees, can be determined by each financial institution and varied within a single establishment. For example, in a supermarket, one or more terminals can be placed at locations where customers could receive check cashing authorizations, while another terminal could be used at a courtesy counter operated by store personnel to handle customer deposits and/or cash withdrawals from checking or savings accounts. Programming in each terminal's 256-bit programmable read-only memory (PROM) identifies the terminal and the types of transactions to be performed.

Programs stored in the terminal's 4K-word read-only instruction memory determine the operating sequences and control other operating functions, including input and output editing. Central processor programs handle more sophisticated system functions, such as various responses to be printed on documents and procedural codes to be shown on the terminal display. This results in the opportunity to create a finely tailored system despite the relatively fixed nature of the terminal itself.

The microprocessor housed in each terminal, with its MOS memory, provides a variety of functional capabilities. It controls data entry, display, transmission, and printing at the terminal. Transmissions of transaction data to and from the host computer incorporate character and message block checks to maintain data integrity. The microprocessor checks certain characteristics of the entered data and reports violations by illuminating prompter messages. Terminals are programmed to detect excessive error conditions, and will illuminate "Please Ask for Assistance" if an operator makes the same error on the third re-entry try. The microprocessor also performs an automatic Clear function that prepares the display and buffer to receive a repeat entry.

Local tests are performed on certain entries to determine whether the data is within established parameters. Each data field is fixed as to the maximum and/or minimum digits it must contain, and the microprocessor will signal an error and retry attempt if any entry is found to violate those parameters. Magnetic stripe encoding is also examined for certain standard validity checks in the ABA format.

multi-connector plug to connect into the communications line and the power source. The plug receptacle also contains a 256-bit programmable read-only memory (PROM) used for terminal and merchant identification and transaction sequence information.

Communications with a central computer system can be accomplished without an intervening control unit, or through a Concord Communications Controller Module (CCM). The CCM can emulate various IBM devices in either binary synchronous communications (BSC) or synchronous data link control (SDLC) protocol.

CONFIGURATION

Terminals are directly connected to a multi-drop, full-duplex, voice-grade, 4-wire, dedicated communications line. Each drop can have up to 10 terminals connected to the telephone circuit without a controller or bridging equipment. The number of drops will normally be limited by common-carrier line noise specifications to 20 when operating at a data rate of 1200 bits per second. The maximum number of terminals that can be connected to a single telephone circuit, however, is 94.

Terminals can be placed at checkout counters and customer courtesy counters to be operated by store personnel, or they can be placed in areas suitable for access by customers and operated by the customers themselves. The choice depends on the requirements of the particular user and the functions that are to be performed. The units can be operated with or without magnetic stripe plastic cards, and a separate keypad is available as an option for the introduction of a personal identification number by the customer when the terminal is operated by store personnel. An administrative terminal with an alphanumeric keyboard and a line printer which is compatible with the 750 in a network can also be supplied by Concord.

Off-line operation is possible to a limited extent. In the event of failure in the communications line or at the central processor, the microprocessor in the terminal can allow the terminal to continue operation in emulation of on-line activity. In that mode, transaction data is recorded on the checks that are cashed or other documents handled in the terminal. Transaction sequence numbers are retained so that the central system can determine the number of transactions made during interruption. The data is re-entered via the terminals when contact is restored.

COMMUNICATIONS

The terminal standard integrated modem is compatible with Bell 202 series modems at 1200 bits per second. As an option, the terminal modem is compatible with the Bell 103 series modems at 300 bps. The 750 Transaction Terminal utilizes a 10-bit ASCII code, including even-parity vertical redundancy checking, and is compatible with the communications discipline established for NCR terminals such as the 279 Teller Terminal. Inbound and outbound messages are transmitted as blocks with terminating block-check characters. Each terminal on a multi-point line is assigned a unique polling identification character, and the terminals on a circuit can respond to either discrete or string polling.

The 750 can communicate with a suitable computer port, either without an intervening control unit or through a Concord Communications Controller Module (CCM). The CCM provides line control and polling for up to 94 Concord terminals on a line, and, in various models, will communicate with a CPU by emulating the IBM 2260 Display Station or the 3270 Information Display System operating in binary synchronous mode, or by emulating an IBM synchronous data link control device.

Concord Computing Corporation
750 Transaction Terminal

More extensive verification procedures can be performed by the host processor. If the CPU should identify a violation of the criteria for a particular field, it can issue a reply message commanding the illumination of specific prompter messages at the terminal. When the transaction is re-entered, the preamble will include the merchant and terminal identification data, as well as the transaction number of the original transaction.

The use of a transaction number is a very useful function of the system. Each terminal has a four-digit counter that applies a sequential number to each transaction. The number is dispatched to the central processor with the transaction data. The transaction's ID remains with it even when the transmission is found to be in error and is returned for re-entry as cited in the previous paragraph. However, the ID number is also dispatched with each response from the computer concerning a valid transaction, and is checked by the terminal microprocessor to ascertain that the response corresponds to the inquiry.

Another function of the transaction counter is to maintain integrity of the system when forced to operate in an off-line mode. Transactions made off-line continue to be numbered sequentially so that when communications with the central processor are restored, the host can determine how many off-line transactions were made by comparing the final on-line transaction number with the current reading. Then, when the off-line data is entered into the system manually, the host can check that the correct number of transactions are accounted for.

The system is programmed to allow 16 seconds for a response from the computer for normal transactions. The terminal sets a 16-second time-out after the host acknowledges receipt of an errorless inquiry. It also displays the digits 08 over the "Wait" message, and decrements the value to zero at one unit per second. If the terminal is not selected for a reply after 8 seconds, the display resets to 08 and decrements in the same way. If no reply has been received within 16 seconds, the "Out of Service" prompter will be illuminated and a fault code will be displayed. The fault code that occurs in this instance is one of several that comprise the message pointing feature of the terminals. By inserting "blank" character codes in the data sequence directed to the display, the host computer can position display digits above one of five messages imprinted below the display: "Decline," "Wait," "Call," "OK," and "Reason." For example, if a credit transaction requires intervention by an authorization operator, the host computer would position a 2-digit authorization center code over "Call" and a 2-digit reason code over "Reason." If a message pointer having no numeric significance is required, the display positions "U" symbols above the appropriate message.

Messages can be varied depending on whether the terminal is being operated by customers alone or by store clerical personnel. A standard option allows the prompter to signal, on a customer-operated terminal, the "seek

SYSTEM CONTROL

Terminal activity is controlled by the programs stored in the read-only memory of the microprocessor. The terminal can be programmed according to the requirements of each user, depending on the specific services to be performed. It can be customized both as to the sequence of operations and the messages displayed.

The microprocessor is implemented in MOS memory and LSI circuitry. Its two memory components include a 4096-word fixed ROM that stores the instructions which control the basic operations of the terminal, and a 256-digit working storage unit that provides processing memory and buffer storage for data communications.

Pressing a transaction key starts the microprocessor, and the prompting sequence which will follow for that key is determined by the coding in the PROM located in the plug receptacle. Each transaction key can start a different entry sequence, depending on the coding of the PROM in the receptacle to which the terminal is connected.

COMPONENTS

750 TRANSACTION TERMINAL: The 750 Transaction Terminal is an integrated unit that includes a microprocessor and telecommunications interface in addition to the operating components. Input is obtained from keyboard entry, and optionally from a magnetic stripe card reader and an auxiliary customer PIN pad. Also, the plug-receptacle PROM contains terminal and merchant identification data that is read by the microprocessor with each transaction, and the current value of a 4-digit transaction counter is transmitted with every inquiry. Output is generated from a central computer file and is received by the terminal and displayed or printed.

The 750 is 15¾ inches wide, 13½ inches high, and 10 inches deep. It weighs 40 pounds and draws 2 amperes at 120 VAC, 60 Hz. No special environmental conditioning is required.

The terminal keyboard consists of a 12-key numeric set with the digits 0 through 9 and Clear and Enter keys, and eight transaction keys. Typical funds transfer or check cashing transactions begin with the actuation of a transaction key; seven of these keys select preprogrammed sequences, while the eighth is a Special Function (SF) key that permits clerks or supervisors to conduct a wide variety of special transactions. The sequence of operations following the use of the SF key is determined by a special function code entered immediately thereafter. The legends on the transaction keys can be customized to reflect the specific applications.

A 10-digit panel displays numeric digits, the letter "U," and spaces. There is a fixed dollars/cents decimal point separator when amount fields are called for. Continuous overflow is permitted for display of keyboard-entered fields of more than 10 digits. Characters enter from the right, and the display field shifts left with each entry. Fixed messages (e.g., "Decline," "Wait," "Call," "OK," and "Reason") can be printed immediately below the display panel to occupy two spaces each. The central computer system can generate codes to be positioned appropriately above the legend in the display to direct the operator to a specific course of action.

A series of 12 backlighted messages prompt all transactions through their proper sequence. These prompter displays are fully programmable, and the fixed legends can be customized to reflect the appropriate messages. Typical messages would include "Enter Amount $ and ¢," "Enter Personal Code," "Insert Receipt," "Proceed According to

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750 Transaction Terminal

assistance" message rather than displaying a coded message. When customer-operated terminals are functioning off-line, a standard programming option conceals the communications fault condition so that users are unaware that the transaction is not reaching the central computing system.

In summary, the 750 Transaction Terminal offers a wide variety of sophisticated functions. The opportunity for customers to activate the device without aid from store personnel permits some unique and potentially useful services. We use the word "potentially" because it has not yet been demonstrated that customers can and will use these terminals successfully. But the 750 appears no more difficult to operate than an automated teller machine, except perhaps for the insertion of documents into the printer tray, and the terminal has an advantage over most ATM's in that it will be located where store personnel are available to offer help when required.

Assuming that customers can be persuaded to use the 750 to obtain check cashing authorization directly from the banking institution's central file, and perhaps to perform other transactions as well, the 750 has the obvious benefit for the retailer of not requiring employees to operate the terminal. The customer, in turn, may experience fewer delays in obtaining authorizations and will gain a certain amount of privacy in making the transactions. Also, the embarrassment of inadvertent overdrafts is avoided; and, without an operator, the customer avoids embarrassment if the request for funds is denied for any reason.

Thus, it will be most interesting to see whether the Concord Computing concept of customer-operated terminals takes hold. If not, the 750 Transaction Terminal will nonetheless remain a worthy competitor in the market for manned remote service units.□

Code," etc. The terminal microprocessor controls the illumination of various combinations of prompter messages during the data entry phase of each transaction.

A magnetic stripe card reader is an optional component. It reads data according to ABA Track 2 standards and transmits the information to the terminal's working storage. The ABA Track 2 format includes Expiration Date and Discretionary Data fields. Both these fields can be printed on documents and/or transmitted to the host processor according to encoding in the PROM, or suppressed.

The terminal printer prints documents on five lines using an ink ribbon impact technique. The printer will complete the printing of a maximum of five 31-character lines and eject the document in approximately five seconds. Printing is done on the underside of the inserted document; therefore, checks should be inserted face up for printing on the backs, and customer receipts and other documents should be inserted face down. Documents must be between 3½ and 8¾ inches in width and between 0.003 and 0.018 inch in thickness. There is no restriction on the length of documents. Documents less than 6 inches wide must be positioned with respect to a guide mark on the document tray to insure capture of the complete printer field. The vendor claims a failure-free life of 24 million characters for the printer mechanism, and ribbon life is rated at 750,000 characters.

PERSONAL IDENTIFICATION NUMBER (PIN) KEYBOARD: A PIN pad, as it is commonly called, can be connected by a cable and located up to six feet away from the 750 terminal. It is used by customers for identification, usually in conjunction with a magnetic stripe card, by keying in a secret personal number. The unit consists of 12 keys, including the digits 0 through 9 and "Clear" and "Enter" keys; a backlighted message that signals when the number is to be indexed; and an inscribed message that informs the customer how to clear errors and re-enter the correct number.

770 ADMINISTRATIVE TERMINAL: A network can employ one or more administrative terminals. Each of these units consists of a 52-character alphanumeric keyboard and a 30-characters-per-second printer. Administrative terminals can be used for various input and output tasks, including file maintenance and the printing of reports generated by the central processor. An Administrative Terminal Buffer is required for the attachment of up to two terminals each to a network of 750 Transaction Terminals.

DELIVERY

Concord Computing currently promises delivery within 90 days following receipt of order.

PRICES

The prices quoted below are for purchases of from 10 to 199 units. Prices for 1 to 9 units are higher, and discounts are available for purchases in greater quantities. The terminal itself, for example, is quoted at $1,650 each in quantities of 400 or more, a 30 percent reduction from the single-unit price.

		Purchase Price	Monthly Maint.
750-1	Transaction Terminal with 4096-word ROM	$1,900	$12.50
750-02	PIN keyboard	150	No charge

IBM 3606 and 3608 Financial Services Terminals

MANAGEMENT SUMMARY

The IBM 3606 and 3608 terminals are designed specifically to be located in retail stores or other locations remote from banking premises and used to perform transactions for customers of a financial institution. The units are integral parts of the IBM 3600 Finance Communication System, an on-line system that also includes teller terminals supporting modular components, and the IBM automated teller machine. Detailed descriptions of the 3600 system and the 3614 Consumer Transaction Facility (automated teller) appear in this publication in Reports B11-491 and B21-491, respectively.

The positioning of the 3606 and 3608 as units of a larger system implies the utilization of other IBM equipment, and this is precisely the case. The use of IBM system controllers and a System/370 central processor is implicit in the adoption of the 3606 or 3608 terminals at this time. However, it should be kept in mind that various configurations are possible, and it is not necessary that the user also have an IBM on-line teller system in order to place remote terminals in nonbank locations.

To elaborate on that point, imagine that the financial institution has access to an IBM System/370 computer (its own, or at a service bureau) with its customer files stored therein. Then, the 3606 and/or 3608 Financial Services Terminals can be used to access the system through a 3601 Finance Communication Controller serving as a local minicomputer controller. The financial institution may or may not have an IBM or other on-line teller system accessing the same or another host system. Although that example may not represent the most likely configuration,

The 3606 and 3608 terminals are designed primarily for operation at retail point of sale locations. They form an integral part of the IBM 3600 Finance Communication System and can function as part of a complete on-line banking system or as a separate network via a 3600 system controller connected to a System/370 computer. In either case, standard IBM hardware, software, and communications procedures are used throughout the network.

CHARACTERISTICS

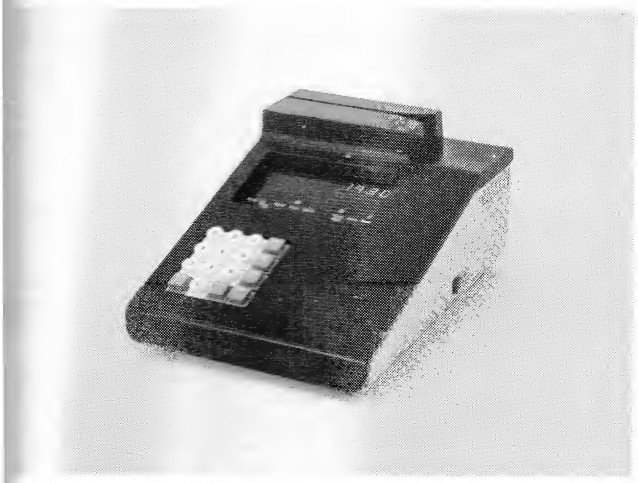
MANUFACTURER

International Business Machines Corporation, P.O. Box 10, Princeton, New Jersey 08540. Telephone (201) 329-1000.

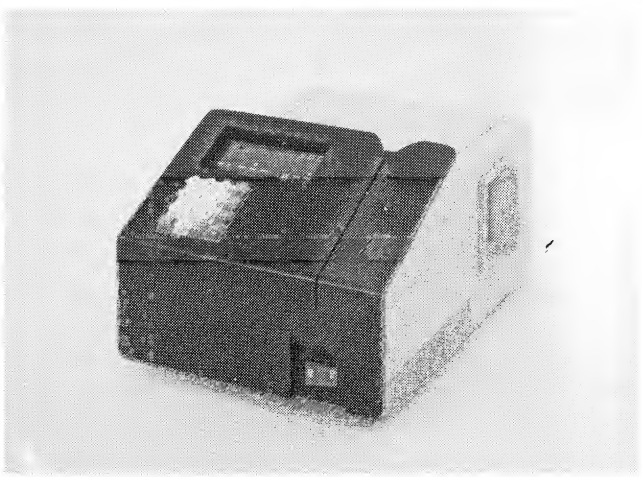
SYSTEM PROFILE

The central computing system used with every 3600 Finance Communication System, of which the 3606 and 3608 Financial Services Terminals are a part, consists of an IBM System/370 central processing unit with the relocate feature and with associated main storage, channels, input/output devices, a system control program, optional user-written data base/data communication programs, and application programs. The CPU can be any one of the System/370 Models 125 through 168.

Details on the complete 3600 FCS, which can include teller terminals and other in-bank devices, automated teller machines, and the remote 3606 and 3608 banking terminals, can be found in Report B11-491.



The IBM 3606 Financial Services Terminal is a compact and versatile unit for use at the point of sale and other remote banking locations. In addition to the standard function keys, a special key allows the numeric keyboard to be used to index a variety of functions according to the specific requirements of the user.



The IBM 3608 adds a printing capability to the performance characteristics of the companion 3606 POS terminal. Forms for printing are entered into the chute on the right side, and are ejected on the left after printing. A variety of choices is offered in print formats, and one line of OCR 7B type can be included as an option.

IBM 3606 and 3608 Financial Services Terminals

it is entirely possible. In most cases, the 3606 and 3608 terminals will probably be extensions of a larger network that includes teller terminals and other on-line banking equipment.

The 3606 and 3608 are both completely integrated units, and they differ only in that the latter includes a printer. The user can install either or both at retail locations, depending on the particular requirements of the system being implemented. In operation, information is entered through a keyboard and a magnetic stripe card reader. A display panel and a series of indicator lights signal a response from the computer via the system controller. Off-host fallback is provided through disk storage at the system controller, and terminals located at a remote site can use the dial-up capability of a Terminal Attachment Unit in the event of failure in the leased line to the controller.

The terminals can be used to perform routine banking transactions at the point of sale as well as credit authorization and check guarantee functions. Simplicity of operation and fast response times make the IBM Financial Services Terminals quite attractive for these programs. However, although the IBM 3600 system has been installed by several financial institutions at this writing, the 3606 and 3608 were introduced some time later and are not yet in service. First customer deliveries are scheduled for March 1976.

As an adjunct to an existing 3600 on-line banking system, the IBM POS terminals should be formidable in the marketplace. They enable the user to implement a remote banking terminal system, accessing the customer data bank, at a low per-terminal cost and in a relatively short time span. On the other hand, the terminals are usable only in communication with an IBM System/370 computer and the 3600 system controller. Thus, only those financial institutions now using or contemplating the use of those devices will be installing the 3606 and 3608. In that regard, the POS terminals are much like the IBM 3614 automated teller machine, and the company is gambling that its large installed base of System/370 computers and its prospects for upward migration from the System/360 will furnish a sufficient market for the components of the 3600 system. It seems to be a safe bet also that any new central computer systems introduced by IBM within the next few years, at the least, will be compatible with the 3600 system and its components.

IBM also markets integrated point of sale systems for the retail market. These systems, designated the 3650 Retail Store System and the 3660 Supermarket System, are designed to automate the checkout function while at the same time maintaining inventory records and automating other operations associated with the retailing industry. The IBM POS systems have much in common with the 3600 Finance Communication System: all are fully integrated, and all rely on a system controller that is connected to a System/370 central computer system. The CPU operating systems are the same, and although the

CONFIGURATION

The 3606 and 3608 point of sale terminals can be operated directly from a 3601 Finance Communication Controller (either locally or from a remote location), from a subloop on a 3614 Consumer Transaction Facility (automated teller machine), or from a subloop on a 3604 teller terminal with an integrated modem. If the 3601 is remote from the terminal location, the most likely configuration will have the POS terminals connected to a 3603 Terminal Attachment Unit that provides a data communications link to the 3601.

Complex rules govern the maximum number of terminals that can be interconnected. In general, terminals are connected to the controller in groups called "loops." All terminals on a loop are interconnected, but they cannot transmit directly to one another. There can be up to six loops connected to a 3601 Controller, in addition to the communications link between the controller and the central computer.

The maximum number of terminals that can be connected to one loop is a function of the loop speed and the device speeds. In the case of the 3606 and 3608, the maximum number of terminals will vary according to whether other terminals are connected on the same loop. Assuming that a loop contains only 3606's, 3608's, or a mixture of the two, the number of terminals possible varies with the type of loop (local or remote), total distance around the loop, and other considerations. For a local loop with the 3606 and 3608 operating at a typical speed of 22.5 characters per second and a loop speed of 1200 bits per second, the maximum number of 3606 terminals would be 48 or the maximum number of 3608 terminals would be 35. Each remote loop could have up to 46 3606's or 35 3608's. Thus, a controller with only Financial Service Terminals on its one local loop and five remote loops could handle up to 278 of the 3606 terminals or 210 of the 3608 terminals.

In the final analysis, the design of any configuration of the 3600 system, in terms of the number and types of terminals, system controllers, and communications links, requires careful planning and consultation with IBM technicians.

COMMUNICATIONS

The IBM 3606 and 3608 terminals are connected to, and operate under control of, a 3601 Finance Communication Controller. The 3601 controller, in turn, is connected to a 3704 or 3705 Communications Controller through which are interfaced the communications lines to the System/370 central computer.

The terminals are connected to the controller in closed, unidirectional loops. A local loop, which is connected to a loop feature in the 3601 controller, can be up to 2000 feet long. A loop feature for the local loop can accommodate a loop speed of 1200, 2400, or 4800 bits per second. Every 3601 contains at least one loop feature for a local loop.

A typical remote loop includes telecommunications lines that connect a loop feature with a 3603 Terminal Attachment Unit and its associated group of terminals at a remote location. The group of remote terminals, called a remote subloop, can be up to 2000 feet long and operates at a speed of 1200 bps.

A duplex telecommunications line is used for multipoint attachment of several 3601 controllers to a 3704 or 3705 controller, or for point-to-point attachment of one 3601 controller. At any one time, one 3601 controller on the telecommunications line can send data to or receive data from the 3704 or 3705. When several 3601's are attached

IBM 3606 and 3608 Financial Services Terminals

first POS systems installed used the IBM Binary Synchronous line control procedures, current versions utilize the Synchronous Data Link Control technique, the same protocol that is employed within the financial system.

Thus, the similarity in system control and communications procedures, plus the expansion of the financial industry system into point of sale locations through the 3606 and 3608 terminals, present a strong possibility for the eventual merging by IBM of the two types of systems into a new supersystem that encompasses the functions of both. That eventuality depends to a great extent upon the ultimate directions taken by EFTS—and these, in turn, are predicated to a significant degree upon largely imponderable factors: consumer acceptance and legislative activity. But assuming that the early success of remote banking at the point of sale continues, the 3606 and 3608 will assuredly play an important role. Beyond the near term, a merging of the banking and retail transactions on common terminals will offer financial institutions an entirely new market to service, and IBM's position in both markets would lead to a pioneering effort to make it technologically feasible. □

to the line, one controller can send data while one other controller on the line receives data.

Synchronous Data Link Control (SDLC) is the line control discipline that is used by the communications controller to direct data transmission on the telecommunications lines. The SDLC technique is more efficient, particularly for full-duplex facilities, than previous IBM line control methods. Data transmission is in fully transparent 1-bit byte form; i.e., any of the 256 code combinations can be used as data.

SYSTEM CONTROL

All functions of an IBM 3600 system, including those of the 3606 and 3608 point of sale terminals, are controlled through the 3601 Controller. The 3601 has the capacity to perform certain processing tasks including arithmetic, comparison of fields, testing of condition codes and branching, and table look-up. In addition, data can be transmitted back to the central processor, and the results obtained from the processor can be output on one or more terminals.

Programs for the 3601 are created on the System/370 computer. A Control Image Set, consisting of control blocks and tables derived from a set of configuration macros, and an Application Image Set, consisting of executable code derived from a set of application macros, are created in a 3600 system library stored on disk at the central computer site.

The system control program of the central computing system can be any one of IBM's virtual storage operating systems: DOS/VS, OS/VS1, or OS/VS2. The Virtual Telecommunications Access Method (VTAM) and the Virtual Storage Access Method (VSAM) are used with any of the VS operating systems. VTAM controls telecommunications between application programs in the central computing system and application programs in the 3601 Controller. VSAM enables application programs in the central computing system to store data on and retrieve data from direct-access storage devices.

Data base/data communications (DB/DC) programs can provide the supervisor services that are needed in the system. DB/DC programs can manage communications between application programs and the data access method. These programs can be used with a wide variety of applications, including inquiry, data entry, data collection, and message switching and broadcasting, and can be written by the user or obtained from outside sources. IBM's Customer Information Control System (CICS/VS) and Information Management System (IMS/VS) also support the system.

COMPONENTS

3606 FINANCIAL SERVICES TERMINAL: The 3606 is designed primarily for retail point of sale applications. It includes a keyboard and magnetic stripe reader for the entry of data, indicator lights that describe the status of the terminal or the transaction, and a numeric display that is used to verify entered data and to display responses from the system controller.

The keyboard includes 10 numeric keys and six function keys organized in four rows of four keys each. The function keys provide terminal control and field delimiters. The two terminal control keys are "Clear," which resets the buffer, indicators, and display in preparation for the next transaction; and "Send," which signals the 3601 controller that the terminal has a message ready.

The field delimiter keys are programmable by the user. They are usually defined for typical payment process transactions such as Check, Cash Card, Credit Card, and Space. A keyboard overlay can be prepared by the user to reflect actual functions if the user chooses not to obtain the standard functions.

In addition to the keyboard, data is entered into the terminal by the magnetic stripe card reader. The card is read by passing it through a slot on top of the terminal. The reader will read encoding on Track 2 in the ABA standardized format. At this time, IBM does not offer a separate customer keypad for the entry of a personal ID number.

An 8-digit numeric display is included on each terminal so that the operator can verify data entered through the keyboard and receive messages from the 3601. Each digit entered appears in the rightmost position and shifts one position left with each subsequent entry. All data is stored in a terminal buffer until the "Send" key is pressed, and digits entered beyond the capacity of the display are shifted off and retained internally, up to the maximum buffer capacity. Data entered from the card reader is not shown on the display, but is stored in the buffer.

Messages from the 3601 are in the form of numeric codes or five special characters to provide information in addition to that shown by the indicator lights. Messages can be of any length up to eight digits. The display is cleared when the operator presses any function key.

Grouped horizontally just below the display are the nine indicator lights. Three of the lights have predefined functions, while the remaining six can be user-defined. The standard indicators are "Ready," "Retry," and "Kybd Lock" (Keyboard Lock) to indicate respectively that data can be entered, that the transaction must be re-entered, or that data will not be accepted by the 3606. Unless otherwise defined by the user, the other terminal indicators are for "Enter," "In Progress," "Refer," "Accept," "Decline," and "Hold Card." Thus, it is possible in a great many instances to complete the transaction without the necessity of displaying data on the display panel. The lights on the indicator screens can be seen only when lit.

IBM 3606 and 3608 Financial Services Terminals

The 3606 Financial Services Terminal is 5¼ inches high, 8½ inches wide, and 11 inches deep.

3608 PRINTING FINANCIAL SERVICES TERMINAL: All functions performed by the 3606 are also performed by the 3608, and in the same manner. The keyboard, magnetic stripe card reader, display, and indicator lights are identical except that the card reader slot is positioned differently on the two models. Functionally, responses from the computer can be printed on the 3608 as well as shown on the indicator lights and/or display.

The main difference, obviously, is that the 3608 is a printing terminal that includes a cut form printer, and is necessarily larger than the 3606. It can print one, two, or three lines of information on cut forms with widths from 2.75 to 3.25 inches, lengths from 4.8 to 8.5 inches,and thicknesses from 0.004 to 0.017 inch.

The basic printer can print three lines of 10-pitch alphanumeric characters on single-part paper, card stock, and 2- or 3-part forms at an average print speed of 15 characters per second. This is accomplished through the use of three type-wheels with the characters engraved on the outer circumference. The alphanumeric type-wheel for the top line can be replaced, as an option, with a type-wheel that prints 7-pitch OCR 7B font characters that can be read by OCR scanning devices. The alphanumeric type-wheels are inked by an operator-replaceable inkroll; but the OCR printing is accomplished using impact paper or double-faced carbon paper, and the OCR type-wheel is not inked.

Documents to be printed are inserted in a right-side entry chute, and the printed forms are ejected at the left side of the terminal. There are 11 possible print line locations that are offered in 5 standard versions of 3 lines each, including the optional top-line OCR version. A customer wanting three print lines positioned in locations other than the five standard combinations can obtain a different version on an RPQ basis at the time of order.

The 3608 Printing Financial Services Terminal is approximately 9 inches high, 12 inches wide, and 16 inches deep.

3603 TERMINAL ATTACHMENT UNIT: The 3603 TAU is designed to connect subloops of 3606 and 3608 terminals to telecommunications lines to access the central computer through a 3601 Controller. The 3603 contains an integrated modem, a manual switched-network back-up function, and self-test facilities. The 3603 operates at 1200 bps, and can be used for unattended operation.

The manual switched back-up function enables the device to communicate over regular telephone lines in the event of failure in the dedicated lines. In order to use the back-up function, the user must arrange for a telephone company local loop conditioned for data rates above 300 bits per second, and for a CDT Data Access Arrangement.

DELIVERY

First delivery of the 3606 terminal is scheduled for March 1976, and the 3608 is scheduled for May 1976 delivery. Orders placed currently are individually scheduled.

PRICES

IBM's Financial Services Terminals and the Terminal Attachment Unit are available for purchase or long-term lease only. However, IBM offers these units under its Purchase Pilot Test Plan, by which customers can pay a fee for six months of use, with two three-month extensions allowed. Payments made under the plan can be applied to purchase of the units at a 70 percent rate at the conclusion of the testing period. The fee for the first six-month period and each three-month extension period are as follows (maintenance is included):

	6-Month Period	3-Month Extension
3603 Terminal Attachment Unit	$188	$ 94
3606 Financial Services Terminal	200	100
3608 Printing Financial Services Terminal	475	238
OCR 7B font print option	29	15

Outright purchase prices and monthly maintenance charges for these units are as follows:

	Purchase	Monthly Maint.
3603 Terminal Attachment Unit	$ 750	$3.50
3606 Financial Services Terminal	800	5.00
3608 Printing Financial Services Terminal	1,900	9.00
OCR 7B font print option	116	

Also available is the Alternative Term Plan, which is a 60-month lease contract. Monthly charges for this contract, which include maintenance, are as follows:

	ATP Monthly Charge
3603 Terminal Attachment Unit	$23
3606 Financial Services Terminal	26
3608 Printing Financial Services Terminal	59
OCR 7B font print option	3

TRW Electronic Funds Transfer Terminal/115

MANAGEMENT SUMMARY

TRW's Financial Systems Division was founded as Financial Data Sciences, Inc. (FDS/i). The company was acquired by TRW in 1974 and renamed the FDS/i Division of TRW. The present name was adopted in 1975. The company markets on-line teller terminal systems for both commercial banks and the thrift industry, and descriptions of those products can be found behind Tab [illegible] of this publication.

The development of the Electronic Funds Transfer Terminal/115 was brought about through the implementation of an experimental funds transfer system by a large West Coast savings and loan association. The system required placement of terminals in supermarkets and other retail establishments that could directly access in real-time the association's central computer system. The EFTT/115 is nearly identical with the prototype terminals developed by TRW for that experimental system (which, by the way, is still functioning as one of the pioneering efforts in remote banking from terminals staffed by non-bank personnel).

Probably the most novel aspect of the EFTT/115 is that it is designed to be placed at checkout counters as well as at the store's convenience counter. The terminals used in other remote banking systems generally are in use only at the store manager's location. Placement of terminals at checkout stations requires compact design, quick transaction processing, and simplified operation. The TRW design attempts to incorporate all of those characteristics in the EFTT/115.

The EFTT/115 was one of the very first units designed specifically to handle banking transactions at remote sites. The terminal is constructed compactly so that it can be placed at a checkout stand, and is double-faceted so that both customer input and store operator input are easily accomplished. The system is designed with the flexibility necessary to allow user options in network configuration.

CHARACTERISTICS

MANUFACTURER

TRW, Inc., Financial Systems Division, 3606 Silver Star Road, Orlando, Florida 32808. Telephone (305) 299-6200.

SYSTEM PROFILE

The basic system consists of terminals and communications support devices. All transactions originated at the terminals are carried out in an on-line mode with a central processing unit. The terminals are self-contained, and there are no separate modules offered as options. Local control is provided by at least one Mini Communications Interface (MCI) at each location. Communication with the central processor is from each MCI over telecommunication lines either directly to the CPU or through a Terminal Processor (TP) 405/406. The TP acts as a message concentrator and provides other pre-processing functions.

CONFIGURATION

As many as 16 EFTT/115 terminals can be connected to a single Mini Communications Interface at a location. The

The suitability of the TRW Electronic Funds Transfer Terminal/115 for use in a supermarket checkout environment is illustrated in this photograph. The terminal has one keyboard facing the checkout clerk, and another (not seen in this picture) is on the opposite side to enable the customer to key in a personal identification number. The top surface of the terminal can be used as a small writing table, and the entire unit is compact enough to cause little or no interference with the flow of purchased items through the checkout counter.

TRW Electronic Funds Transfer Terminal/115

The terminal has two working surfaces: one side faces the store clerk and contains a keyboard, a numeric display and status indicators, and a magnetic stripe card reader. The opposite face of the terminal contains a 12-key numeric keyboard for use by the customer. The entire unit weighs only 15 pounds and occupies 1350 cubic inches of space (10 inches high, 18 inches wide, and 7.5 inches deep.)

Although it is probable that in most applications magnetic stripe plastic cards will be used, the system can also utilize the terminal without plastic cards. In either case, the customer keys in a Personal Identification Number (PIN) that, along with an account number, will properly identify the customer. The card, of course, provides an extra measure of security and speeds the transaction by providing instantaneous reading of an account number and other data from the stripe without the necessity for keying in the information. Through a proprietary technique of encryption, PIN's are not transmitted from the terminal in clear text. Even if messages were intercepted, the determination of PIN's would be difficult if not impossible.

Assuming the use of a card, a transaction proceeds with the customer first presenting the card to the clerk. The card is passed through the card reader, and the customer enters the PIN on the keypad. The clerk keys in the type of transaction and the amount, visually verifies the input as displayed, and then presses a Send key, which dispatches the entire transaction to the central file. Status lights on the terminal indicate the result of the inquiry. Usually, this will be simply the lighting of the OK indicator, telling the clerk to complete the transaction as entered.

Use of the EFTT/115 will ordinarily be in the retail environment at the point of sale, with the terminals connected on-line to a financial institution's central processor. Transactions can include ordinary banking functions for a specific account, such as deposits, withdrawals, and transfers from the customer account to the merchant account. Credit authorization and check guarantee functions will also be desirable in most cases, and can be handled easily by the system.

The EFTT/115 requires local support through a Mini Communications Interface (MCI). Each MCI can control up to 16 terminals at one location and includes an internal modem to provide the terminals with the ability to send and receive messages over telecommunications lines. Each MCI also contains scanning logic and message buffering to support the terminals attached to it.

Communication with a central processor can be either direct from an MCI or through a TRW Terminal Processor. A TP 405/406 offered with the system is designed to free the CPU from many of the communications processing tasks. It provides pre-processing functions such as message reformatting, local and remote polling, and data concentration. Current software for the Terminal

MCI's can interface with a central processor either directly or through a Terminal Processor. More than one MCI, each with a complement of EFTT/115 terminals, can share a single communications lines. The Terminal Processor can handle up to 200 terminals from several MCI's.

Terminals can be placed in any convenient location in a retail establishment. However, they were designed specifically to be located on checkout counters at large food retail outlets. Input at the terminal is handled primarily by store personnel, but the customer is required to key in a Personal Identification Number with each transaction. A magnetic stripe card can also be used for direct input of encoded information, but its use is not essential to the successful operation of the system.

COMMUNICATIONS

All transactions are performed in real-time in interaction with the customer data bank of a financial institution. Communications are performed over a 4-wire, leased telephone line in half-duplex, asynchronous mode. The transmission rate is 1200 bits per second. More than one MCI can be multiplexed to operate over a single telephone line. A dial-up option is available to provide a back-up communications capability in the event of failure of the leased communications line.

SYSTEM CONTROL

The vendor supplies applications software to suit the requirements of each customer. Function keys on the terminal keyboard and status board messages are programmable according to the user's specific needs. Message formats tailor the system to specialized application requirements.

Communications to and from the central computer are controlled by the minicomputer-based Terminal Processor. The input/output interface and the software in the minicomputer are adapted to handle communications with a specific central processor. According to the vendor, current TP software provides for linkage modules which will interface the EFTT/115 terminals into the majority of host CPU networks. In networks not utilizing a TP, that software will necessarily reside in the CPU itself.

COMPONENTS

ELECTRONIC FUNDS TRANSFER TERMINAL/115: The EFTT/115 is a completely self-contained unit designed specifically to perform banking transactions at the point of sale in communication with a central processing system. The actual transactions to be performed can be selected by the individual user; but the basic functions most likely to be chosen include cash withdrawals and deposits to or from a checking and/or savings account, automatic transfers from the bank customer's account to the account of the merchant, check guarantee, and credit verification. Input from the keyboards and a magnetic stripe card reader is transmitted to the central computer, and a response is generated on the terminals' status board.

The terminal is roughly box-shaped, with one of the longer vertical sides containing the operator components and the opposite side containing the customer keyboard. The top of the terminal is left free and can have each institution's operating sequence imprinted thereon. The top can also serve as a workspace for check signing and the preparation of other documents. Positioned at a checkout counter, the terminal provides easy access for both the customer and the store clerk.

On the customer side of the terminal, a small 12-key board is recessed so that it is nearly on a horizontal plane. This

TRW Electronic Funds Transfer Terminal/115

Processors provides for linkage modules which will interface the terminal system into the majority of host EFT networks. The number of MCI-EFTT/115 configurations that can be supported by a single TP 405/406 is a function of several variables. However, according to the vendor, a network of 5 lines might typically handle up to 200 terminals. This would require multiple MCI units sharing a common line. □

positioning provides easier keying and also affords privacy so that the PIN cannot be observed by the clerk or by other customers. The opening for the customer keypad occupies about one-fifth of the total 180-square-inch surface on that side of the terminal. The customer PIN keyboard can be inscribed with 10 keys in an alphanumeric format (or numeric alone), with the 2 additional keys for error correction and message transmission.

A security module in the terminal features a proprietary technique of PIN encryption. The data input is passed through the security module, which provides non-linear, non-reversible, bit-streaming encryption through an algorithm implanted in both firmware and hardware components. The PIN, therefore, is not dispatched in clear text, and validation is done within the central processing unit.

The retail store side (operator's console) is angled back slightly from the vertical and includes a keyboard, a numeric display, terminal status indicators, and a magnetic stripe card reader.

The keyboard contains a combination of 10 numeric keys and 10 function keys. All of the function keys can be programmed according to the needs of the user. More-or-less standard functions would include keys for Start, PIN Enter, Send, Void, and Clear. The remaining function keys could identify the type of transaction taking place.

The numeric display panel indicates data that is keyed in (excepting, of course, the customer-indexed PIN) so that the operator can make visual verification prior to transmission. The display can also be used to present data received from the computer. Although it is unlikely that account balances or similar information would be made known in this environment, the display might, for example, reveal the upper limit for an individual's check-cashing privilege, or the amount that can be borrowed against a line of credit. The display can accommodate only 8 digits, but buffering allows additional numeric entry of up to 64 characters, which can be "paged" through the display 8 digits at a time.

The status display has six LED (light-emitting diode) message lamps that indicate the current transaction status to the clerk. The messages include OK, Refer, Hold, Enter, Re-Enter, and Wait.

The card reader is a simple pass-through device in which the operator retains the card in hand while pulling it through the reader. It is a read-only unit for data encoded in the standard ABA Track 2 format.

MINI COMMUNICATIONS INTERFACE (MCI): The MCI acts as a local controller and contains an internal modem for communication with a central processor or a Terminal Processor 405/406. Each MCI can handle up to 16 terminals in one location from a multidrop line.

TERMINAL PROCESSOR 405/406. Essentially the same minicomputer controller used in the vendor's banking system, but with appropriate software, the TP has 32K 16-bit words of memory. It can communicate with a central processor at line speeds up to 9600 bits per second. It has input/output channels with multiple serial and parallel slots. As an option, a diskette unit can be interfaced to the TP to provide 256K bytes of additional storage.

DELIVERY

The EFTT/115 terminals are now available, for delivery and installation approximately 90 days after receipt of order.

PRICES

Detailed prices were not released by the vendor. However, overall costs for typical systems have been made available. For a small system, in only one store, TRW anticipates a purchase price of approximately $40,000 with a maintenance charge of about $315 per month. The comparable lease price for a 5-year term would be $970 per month. For a larger system that includes 10 stores, the purchase price would approximate $215,000 and the monthly maintenance charge would be about $1,740. That system would lease for $5,200 per month. Several different maintenance plans are available. ■

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